

Section 7

Dairy Cow Breeding

by Donagh Berry, Frank Buckley



Introduction

Breeding contributes half the performance gains in dairy herds. Genetic gain from good breeding decisions is cumulative and permanent. Introducing superior genetic material into a herd will remain for several generations and can be built upon. On the other hand, poor sire selection decisions, can have serious and long-term repercussions for the future profitability of the herd. Evidence from a diverse range of environments around the world shows that cross-breeding offers dairy farmers a genuine opportunity to counteract the negative affects of past selection programmes.

- ① What are the key principles of dairy breeding?
- ② What is meant by genomic selection?
- ③ How important is EBI?
- ④ How can I increase bull 'reliability'?
- ⑤ What developments can we expect in dairy breeding?
- ⑥ Why consider cross-breeding?
- ⑦ What breeds should I use?
- ⑧ Are there any downsides to cross-breeding?

Dairy Cow Breeding

① What are the key principles of dairy breeding?

- Herd economic breeding index (EBI) must increase year-on-year, recognisable as higher EBIs in the younger animals.
- Genetic gain in individual component traits can be achieved by selecting a team of bulls with superior average genetic merit to the herd; the genetic merit of the bulls can be obtained from the active bull list and the genetic merit of the herd can be obtained from HerdPlus® reports.
- To increase herd EBI by at least €5 annually, the average EBI of the team of bulls used should be at least €120 greater than the EBI of the herd.
- Mate sufficient early calving cows to generate ample replacement heifers (accounting for losses); approximately six AI straws are required per heifer milking in the parlour in two years.
- Cross-breeding can be used to increase profitability further through exploitation of heterosis, (or hybrid vigour). This is the additional benefit in performance observed in cross-breeds over and above their parental mean (see also chapter on bull selection).

② What is meant by genomic selection?

- Genomic selection is simply a fancy term for “breeding using DNA”.
- DNA is the backbone of genes which cause differences in performance among animals. DNA is passed from parents to offspring and is therefore fundamental to breeding. Animals with the best DNA are selected as parents of the next generation.
- DNA is the same in all cells of the body and remains the same throughout life.
- If we know how each piece of DNA effects performance, by taking a DNA sample of a calf, we can predict its performance later in life.
- Genomic selection currently constitutes approximately one-third of the EBI of the animal; the remainder is from the traditional method of genetic evaluation of the parents.

- Reliability of EBI from genomic selection currently averages 54% but varies between animals; this means that fluctuations in animal EBIs over time may still happen, but to a lesser extent than previously.

③ How important is EBI?

- The economic breeding Index (EBI), launched in 2001, describes the expected profitability per lactation of the progeny of the individual.
- An animal EBI of €200 means the progeny of that animal, on average, will yield €200 more profit per lactation than the average progeny of an individual of EBI €0, producing in a similar environment. Similarly the progeny of the €200 individual will yield €50 more profit per lactation than the progeny of an individual with an EBI of €150.
- The EBI is currently made up of six sub indexes.

Milk production sub index – includes milk, fat and protein yield.

Fertility sub index – includes calving interval (measure of fertility) and survival to the subsequent lactation.

Maintenance sub index – includes the cost of growing and maintaining the progeny of an animal differing in size (i.e. bigger animals require more feed to attain that weight and also maintain that weight).

Calving performance sub index – includes calving difficulty, gestation length and calf mortality.

Beef performance sub index – includes traits associated with cull cow value and progeny carcass value.

Health sub index – includes udder health and lameness.

How to

Increase herd EBI

- Determine the genetic merit of your herd from HerdPlus® for EBI and the main component traits of fat yield, protein yield, calving interval and survival.
- Select only bulls from the ICBF active bull list.
- Select a team of bulls (at least 4) plus 1–2 easy calving bulls for use on heifers; it might be easier to eliminate bulls which are not suitable for your farm rather than immediately trying to select suitable bulls.



- Ensure average of bull team is genetically superior to the average genetic merit of your herd to ensure genetic gain.

- Ensure no bull is mated to a related cow.

④ How can I increase bull ‘reliability’?

Reliability

- Young animals have a low reliability for EBI which means that their EBI may fluctuate as more information on the animal or its relatives accumulates.
- For a given quantity of information, the reliability will be greater for the milk production traits in the EBI and lower for the fertility and survival traits.
- The risk associated with low reliability of individual sires may be overcome by using “teams” of sires. Although the EBI and reliability of the EBIs of individual bulls may be low, the reliability of their team EBI can be much better.

For example, four sires each with a reliability of 60% and respective EBIs of €230, €240, €250, and €260; the reliability of this team of bulls is 90% and their daughters on average will have an EBI of €245.

⑤ What developments can we expect in dairy breeding?

- Genomic selection is now the accepted method of genetic evaluation in most dairy populations.
- Reliability of animal EBI from genomically selected animals (and relatives) will increase with time as research and data availability improve.
- The economic values in the EBI will continually be updated, as necessary, in line with expected changes in prices and costs of production.
- New traits, especially those related to health, product quality, and environmental footprint may soon enter the EBI.
- An index to identify beef bulls for use on dairy cows to maximise profit from the sale of resulting calves will soon be available.

⑥ Why consider cross-breeding?

A successful cross-breeding strategy can:

- Introduce favourable genes from another breed selected more strongly for traits of interest
- remove the negative effects associated with inbreeding depression for many traits to capitalise on what is known as heterosis or hybrid vigour (HV).

HV means that cross-bred animals usually perform better than that expected based on the average of their parents. HV is generally higher in traits related to fitness and health i.e. traits which have lower heritabilities. Heterosis for production traits is usually in the range of 0 to 5%, whereas heterosis for traits related to fertility is usually in the range 5 to 25%.

Research conducted independently by both Teagasc Moorepark and ICBF indicates that the average benefit from crossing two dairy breeds (over and above that explained by the EBI) is €100 per lactation per cow.

⑦ What breeds should I use?

Norwegian Red

- Originates from a long-term breeding program in Norway that has been selecting for improved fertility and health for many decades.
- Teagasc Moorepark research has shown that lactation milk solids yield is lower for the pure-bred Norwegian Red cows compared to their Holstein-Friesian counterparts, but there is little difference in milk solids yield between the Holstein-Friesians and the Norwegian Red cross-breds. Milk somatic cell count was lower in the Norwegian Red pure-breds and cross-breds.
- The beef merit of male calves from Norwegian Red X Holstein-Friesian mothers is similar to that from Holstein-Friesian mothers.
- Research shows that Norwegian Red X Holstein Friesian cows generated €130 more profit per lactation than Holstein-Friesian cows – largely due to better fertility and survival in the herd of the cross-bred cows.

Dairy Cow Breeding

Jersey

- Research at Teagasc Ballydague farm shows that although the pure-bred Jersey and Jersey cross-bred cows produced less milk yield than their Holstein-Friesian counterparts, milk solids yields of both pure-breds was similar while the milk solids yield of the first cross Jersey was the best. Under the current milk pricing system for manufacturing milk in Ireland the milk of the cross-breds is more valuable.
- Although there was little difference in reproductive performance between the pure-bred Jersey and Holstein-Friesian, the reproductive performance of the first-cross Jersey cross-bred was far superior to that of both pure-breds.
- Jersey cross-bred cows had higher intake per unit live weight and produced more milk solids per unit intake than Holstein-Friesian cows. This greater feed efficiency makes these animals well suited to a grass-based production system.
- Even including the lower calf and cull cow price of the Jersey cross-breds compared to their Holstein-Friesian counterparts, the first cross Jersey in the Ballydague study was €180 per lactation more profitable than the Holstein-Friesian cows in the study.

Dual purpose breeds

In some countries dual-purpose breeds such as Fleckvieh (Simmental) from Austria, Montbeliarde and Normande from France, Brown Swiss from Switzerland and Austria and the Rotbunt DN from Germany are considered the breeds of choice for cross-breeding. These breeds tend to offer superior beefing qualities resulting in increased revenue from male calf and cull cow sales. However, some of these breeds are more likely to present issues with late maturity, heavier calves at birth and increased gestation lengths, compared to Holstein-Friesian and hence are less suited to the rigours of seasonal calving systems.

Evidence from New Zealand suggests that Jersey cross-bred cows are well suited to intensive seasonal grass-based dairy production. The popularity of cross-breeding in New Zealand is due to high productivity in pasture-based environments, superior reproductive performance/survival and consequential benefits in terms of profit. Under the quota regime, the high milk fat content associated with the Jersey, coupled with the inevitable reduction in male calf and cull cow values, meant that the use of Jersey genetics in Ireland was not deemed an attractive option. However, with the advent of post-quota, 'A+B-C' systems of milk payment and a greater focus on cost reduction/increased milk solids output per unit of land area, there is an increasing realization that cross-breeding with Jersey may offer substantial performance benefits in Ireland.

8 Are there any downsides to cross-breeding?

- Increased variation: if both parental breeds differ considerably for a given characteristic (e.g. animal size) then considerable variation in this trait can be experienced with multiple crosses.
- An Irish national breeding programme currently only exists for Holstein-Friesian due primarily to a lack of high quality pure-bred dams of alternative breeds in Ireland. However, good national breeding programmes for other breeds such as the Norwegian Red and Jersey exist elsewhere and genetically elite sires for Ireland can be selected from these countries.
- Unfavourable qualities of other breeds: one of the most commonly cited reasons for lack of interest by farmers in using Jersey cross-breds is the sale value of calves and cull cows. However, because of the superior fertility of the Jersey cross-bred, less cull cows will be sold.
- Although surplus Jersey cross calves are worth considerably less than calves from many other breeds, the loss in revenue is far outweighed by other performance characteristics (e.g., superior fertility) of the cross-bred. Reduced calf value and cull cow value are included in all Teagasc economic analyses using actual data obtained from studies.

Please see appendices at back of manual.

Section 7

Dairy Cow Reproduction

by Stephen Butler



Introduction

In a spring calving herd, cows should calve close to the time when grass begins to grow rapidly. This will maximise production from grazed grass, by far the most profitable feedstuff. If most of the herd calve within a compact period of six to eight weeks, farmers will have more time to focus on general herd management.

- ① What is the benefit of compact calving?
- ② How do I improve my herd's calving pattern?
- ③ How should I manage maiden heifers?
- ④ What should I include in a breeding plan for a compact calving season?
- ⑤ What can I do to ensure a successful breeding period?
- ⑥ How can I best identify and deal with problem cows?
- ⑦ What feed issues are important during the dry period and early post-calving?

Dairy Cow Reproduction

1 What is the benefit of compact calving?

Key fact

Every 1% unit increase in six-week calving rate is worth €8.22 per cow in the herd. For a 100 cow herd, moving from a six-week calving rate of 60% to 90% is worth over €24,000 per year.

2 How do I improve my herd's calving pattern?

Key fact

The first step is to generate large numbers of early calving heifers. Then cull late calvers. To simply maintain the herd you must have 25 heifers entering the herd per 100 cows. To improve the calving pattern 30+ heifers must be entering the herd.

Key considerations

- Achieving a compact calving pattern is not easy, and will require sustained effort over a number of years.
- A compact calving pattern allows calving and breeding tasks to be clearly separated, allowing you to concentrate on one job at a time and achieve better results for both.
- Doing AI yourself has advantages and disadvantages. It can save money and increase flexibility but it can also be time consuming.

3 How should I manage maiden heifers?

Maiden heifers should be managed and bred to calve at the very start of the calving period. This will maximise their chances of staying in the herd for longer and increase their lifetime productive performance. This is only possible if heifers have reached puberty (i.e., have commenced cycling normally) by mating start date (MSD). Puberty in heifers is closely linked to body weight and body condition score.

Why use AI on maiden heifers?

1. They are high fertility animals.
2. They are the highest genetic merit animals.
3. You will be producing early calved heifer replacements from heifers.

4. It is easier to get earlier compact calving with AI than with bulls.

Heifer synchronisation

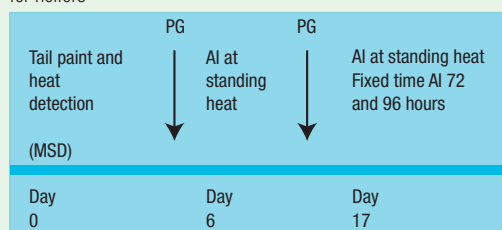
Synchronisation should be used as a management tool to maximise the number of heifers that become pregnant as quickly as possible after MSD. The most popular and cost-effective synchronisation protocols for heifers involve intramuscular injections of prostaglandin. Synchronisation protocols work very well for heifers that have started cycling, but will not work in non-cycling heifers. Heifers must reach target weights outlined in the chapter on heifer rearing.

How to

Synchronise heifers:

- On MSD, tail paint all heifers and inseminate following observation of heat during the first six days of the breeding season.
- All heifers not inseminated in the first six days receive a prostaglandin injection on day six and are inseminated following observation of heat in the next 3–5 days.
- Heifers that failed to come into heat following the first injection of prostaglandin receive a second injection 11 days later (i.e. on day 17).
- Heifers are again inseminated at a standing heat, or receive fixed time AI at 72 and 96 hours after the second injection.
- This protocol generally results in submission rates close to 100% and conception rates to first service of 70%.
- Heifers should be inseminated to a high EBI easy-calving AI bull.
- If possible, observe for repeat heats, and again inseminate to a high EBI easy-calving AI bull.
- Once the period of AI use is over, introduce an easy-calving stock bull.

Overview of prostaglandin (PG)-based synchronisation protocol for heifers



4 What should I include in a breeding plan for a compact calving season?

For most spring calving systems, the breeding season will begin between mid-April and the first week of May. Choose your MSD so calving the following spring coincides with planned turn-out to pasture. After MSD, the aim is to get as many cows pregnant as quickly as possible. The breeding season can be divided into three periods: pre-breeding, AI use and natural service bulls.

Table 1. Effect of submission rate and conception rate on % herd in-calf in the first six weeks

		Conception Rate (%)			
		60	50	40	30
Submission Rate (%)	90	79	70	59	47
	80	73	64	54	42
	70	66	58	48	38
	60	59	51	42	33

Pre-breeding heat detection

Pre-breeding heat detection should begin four weeks before the planned MSD. This is a good time to improve heat detection skills, to train new staff to correctly identify cows in heat, or to try alternative heat detection aids. All heats should be recorded.

By mating start date (MSD), you will be able to anticipate when cycling cows will next come on heat (i.e. week 1, 2 or 3 of the breeding season), and you will also have a list of all cows that have not yet been seen in heat.

- Apply tail paint of one colour (e.g. red) to all milking cows 28 days before the planned mating start date. Apply red paint to late calvers as they enter the milking group.
- Check the tail paint on all milking cows **twice weekly** until MSD. Depending on weather/rain conditions, cows may need to be topped up with red paint.
- Record all cows that have had tail paint removed through mounting, and paint with a different colour (e.g. green).
- At MSD, any cows with red paint are unlikely to have been in heat during the preceding 28 days. Cows with green paint have been in heat at least once during the same period.

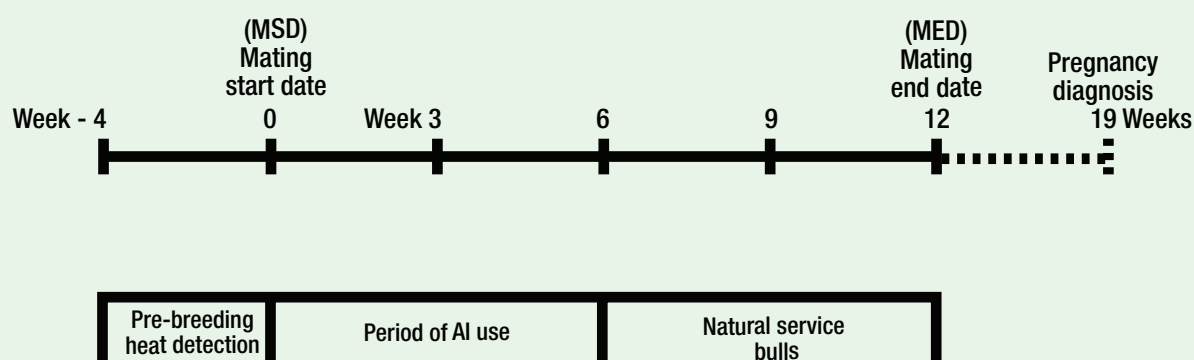
5 What can I do to ensure a successful breeding period?

Once breeding begins:

From MSD onwards, heat detection efforts need to be stepped up for the period of AI use, which should be at least six weeks.

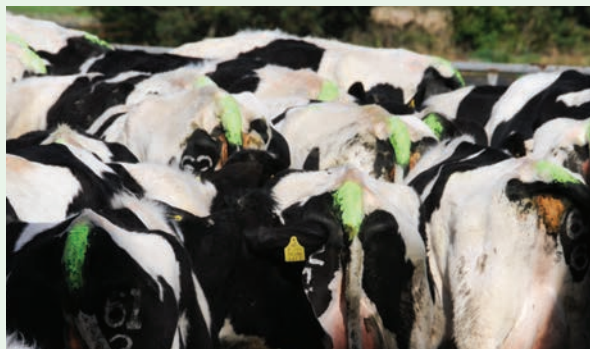
- Observe cows for at least three periods of 30 minutes each day, ideally this should take place when cows are generally inactive (i.e. lying down, ruminating). This improves the chances of spotting restless cows that are more likely to be in heat. Two hours after the morning milking, early afternoon, and again at two hours after the evening milking are ideal times for heat detection.

Figure 1. Breeding programme for compact calving.



Dairy Cow Reproduction

- Switch to a new colour paint after cows have been inseminated (e.g. blue). This will allow you to rapidly get a picture of how your submission rates are progressing.
- Cows with blue paint have been inseminated.
- Cows with green paint were detected in heat before MSD and you should know roughly when to expect them to return to heat.
- Cows with red paint have not yet been inseminated and have not been observed in heat.



How to Ensure success with bulls

Make sure bulls are in good body condition, and have reached the correct body weight for their breed and age well in advance of the breeding season. Purchased bulls should be sourced from clean herds, screened for infectious diseases, and vaccinated with the same vaccination programme as the cows. Buy bulls at least 2-3 months in advance of when you plan to use them.


- The number of bulls required will depend on (i) herd size; and (ii) the proportion of the herd already pregnant to AI.
- For a 100 cow herd, with AI for six weeks resulting in approximately 50-70% of the herd in-calf, at least two bulls will be required. If fewer than half of the herd is in-calf after six weeks of AI, three bulls will be required.

- If possible, rotate the bulls used with the cows. After a week of activity, libido will be restored by resting for several days.
- Where herd size allows, keep more than one bull with the milking herd at a time.
- Monitor bulls carefully for signs of body condition loss, lameness, lethargy, etc.
- Observe bulls to ensure that they are serving correctly.
- Foot-bath bulls.
- Be safety conscious – ensure bull management protocols are followed.

How to Review reproductive performance

Reproductive performance should be reviewed periodically throughout the breeding season. For each animal, record on a breeding chart age, number, date calved, pre-breeding heat date, first service date and bull used, second service and bull used and calving difficulties (see ICBF Chart below). We will focus on the key time-points identified for reviewing reproductive performance in Figure 1.

1. **Mating start date.** Based on pre-breeding heat detection results, you will know if your herd is hitting the target for proportion of the herd cycling by MSD. If the proportion of the herd cycling is lower than 70%, it is unlikely that the three-week submission rate target of 90% will be met. Also, look at what proportion of the herd have yet to calve at MSD. The target should be all cows calved. If more than one in ten have yet to calve, it will not be possible to achieve a compact calving pattern.
2. **Three weeks after MSD.** Review your submission rate. The target figure is 90%. Achieving a high three-week submission rate is a critical driver of fertility performance in seasonal calving systems.
3. **Six weeks after MSD.** All cows should have been bred to AI at least once (with repeats served more than once).



Profit through Science

Dairy Herd Breeding Chart

HerdOwner JOHN RAFFERTY

NID IE2410454

Year 2011



Cow Tag	Cow FB	Cow EBI (E)	Milk (E)	Fert (E)	Cow Details			Lact No.	Date Calved	Calv Ease	T/A	Proposed Bulls			Service Information								
					Cow's Sire	Mat Grand Sire						Bull 1	Bull 2	Bull 3	Pre-Serve Heat	First	Second	Third	Fourth	Preg Test Result			
															Date	Date	Date	Date	Date	Date	Date	Date	Date
IE241045440704	704	106	19	72	40431	CWJ	4	05-FEB-11	1			BYJ	ORL	OOK									
IE241045450706	706	78	28	34	UTC	PLD	4	05-FEB-11	1			SOK	UPH	OOK									
IE241045470715	715	68	11	57	40431	JCA	3					OOK	KOZ	SOK									
IE241045490741	741	69	-28	81	40431	MBH	4	30-MAR-11				KOZ	OOK	ORL									
IE241045490749	749	28	15	13	40431	ANN	2					LLK	SOK	CES									
IE241045490752	752	57	-31	87	40431	ROM	3	04-FEB-11	1			KOZ	OOK	ORL									

4. Mating end date. For a compact calving pattern next year, the breeding period this year should stop after 12–13 weeks of breeding. On many farms breeding periods last 3–4 weeks longer than this. The length of the breeding season is a compromise between the duration of the calving period next spring and the empty rate at the end of this year. Ideally, bull activity will be minimal by 12 weeks into the breeding season. If bulls are still active, it may be necessary to extend the breeding season. Target reducing the duration of the breeding season by one or two weeks per year until you have a breeding season of 12 weeks or less.

If you fail to meet the targets ask the following questions:

- Have all cows calved by MSD?
- What was the herd average Body Condition Score at MSD?
- Have you used tail paint effectively?
- Are you spending enough time detecting heat?

Key Performance Indicator



Pregnancy testing

The herd should be pregnancy tested approximately 5–7 weeks after mating end date (MED).

- confirm pregnancies for cows with AI dates early in the breeding season;
- confirm pregnancies for cows that became pregnant to the bull, and allow an estimate of the stage of the pregnancy and expected calving date;
- identify non-pregnant cows. The target for proportion of cows not-pregnant at the final pregnancy diagnosis is <10%. Based on the results of the pregnancy diagnosis, the six-week in calf rate should also be calculated. This is calculated by counting the number of cows that became pregnant in the first six weeks of the breeding season and dividing by the number of breeding cows in the herd. The target for compact calving systems is >70%.

In addition to ultrasound scanning, pregnancy can also be diagnosed using a commercially available test on individual cow milk samples. The test is accurate on cows that are ≥ 28 days post-breeding, and provides a PREGNANT or NOT PREGNANT diagnosis. The test does not provide information on the stage of pregnancy.

6 How can I best identify and deal with problem cows?

Key performance Indicators



When to get worried about a cow

On every farm, a proportion of cows will be anoestrous (i.e., not displaying behavioural heat) at the start of the breeding period. The return to normal cyclic ovarian activity usually occurs by 30 to 35 days after giving birth. The first heat is often silent, and the first cycle after this heat is usually short (8–12 days). This means that most cows should have displayed behavioural heat by 38–47 days post-calving or earlier.

Failure to show signs of heat by 60 days after calving is called **postpartum anoestrus**. This can be due to either **true anoestrus** or **suboestrus**.

- Suboestrus is when cows have normal cyclic ovarian activity, but are not detected in heat due to weak or silent heats, or due to inadequate observation.
- True anoestrus is when cows have inactive ovaries.

How to



Trouble-shoot breeding problems

Genetic, management and husbandry factors can contribute to poor cow fertility. Some key areas are outlined below:

- Examine the genetic merit of the herd. What is the herd average EBI and the average fertility sub-index? This can be easily assessed using ICBF reports.
- Examine body condition score (BCS). The target herd average BCS at MSD is 2.9. If the cows that have not been seen cycling have low BCS, improve their energy status by increasing grass allowance and/or concentrate supplementation. Alternatively, consider reducing milking frequency to once a day for cows below target BCS.
- Is the diet properly balanced for energy, protein and minerals? Are grazing conditions adequate to allow the necessary grass intake?
- What is the health status of the herd? Were there problems with calving difficulty, retained membranes, metritis? If so, examine the cows that had problems and treat as necessary.

Dairy Cow Reproduction

- Are there infectious disease problems on the farm (BVD, IBR, leptospirosis, salmonella, neospora, mycoplasma, etc.)? Find out the disease status of your herd. Any necessary vaccinations should be carried out well in advance of the breeding season according to the manufacturer's guidelines. Use strict biosecurity to minimise risk of introducing disease.
- Is mastitis or lameness a problem? These can have a negative effect on fertility.

How to Solve weak/silent heats

Dealing with weak/silent heats should include: improving heat detection technique, and ensuring that observation periods are long enough (30 minutes) and frequent enough (3–4 times per day). Resumption of ovarian cyclicity after calving is influenced by nutritional status, BCS, milk yield, calving difficulty, uterine infection, breed, age, and concurrent disease.

How to Solve non-cycling cows

First examine nutritional status and body condition score. Cows have a much better chance of resuming normal ovarian cycles at BCS 2.75 or greater and on a rising plane of nutrition. Body condition score can be improved by increasing pasture allowance, increasing concentrate feeding, and/or reducing the energy output in milk by restricting non-cycling cows to once a day milking until they have been bred or confirmed pregnant.

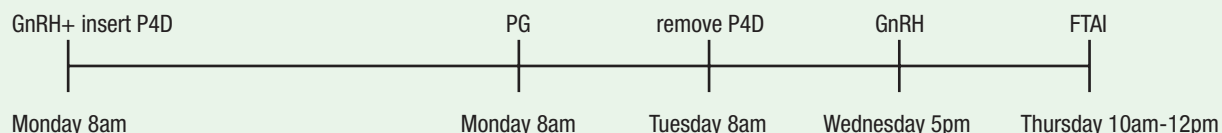
Synchronise non-cycling cows using hormones

Hormone treatments can be used to stimulate resumption of cyclicity, and are most effective if combined with increased energy intake.

The treatment outlined in Figure 2 stimulates a return to ovarian cyclicity, and also facilitates fixed-time AI (FTAI) at the end of the hormone protocol. Fixed-time AI means there is no requirement for heat behaviour, and hence heat detection is not required.

In the illustration, the protocol starts on a Monday and finishes with insemination 10 days later on a Thursday. GnRH = Gonadotropin releasing hormone; P4D = intravaginal progesterone releasing device (CIDR or PRID); PG = Prostaglandin; FTAI = fixed-time AI.

Figure 2. How to synchronise anoestrus cows using hormones



7 What feed issues are important during the dry period and early post-calving?

Setting cows up for good reproductive performance begins before calving. One of the most important factors that regulate fertility is body condition score (BCS). See also nutrition chapter.

Managing cows during the dry period and early post-calving
Setting cows up for good reproductive performance begins before calving. One of the most important factors that regulate fertility is body condition score (BCS), with values ranging from 1 (extremely thin) to 5 (obese).

Key targets for BCS	Average	Range
Dry-off	3.00	2.75-3.25
Calving	3.25	3.00-3.50
Start of breeding	2.90	2.75-3.25

- Cows should gain very little during the dry period, and hence should be close to the desired BCS at dry-off.
- Avoid over-conditioning of cows during the dry period.
- Cows with excessive BCS at parturition will lose a lot of condition after calving.
- Cows that are too thin at calving will also be too thin at MSD, and will have poor reproductive performance.

Key Risks



- Where silage only is being fed during the dry period, ensure that quality and quantity allowed are adequate for targeted BCS (and weight) gain. If inadequate, supplement with concentrate.
- Feed cows in early lactation to minimise BCS loss.
- The main trace mineral deficiencies that occur in Ireland are copper, selenium and iodine, with a lower prevalence of zinc, manganese and cobalt deficiencies. Deficiencies of these minerals are associated with poor reproductive performance, and also reduced milk production. Molybdenum also plays an indirect role, because high levels of molybdenum reduce the absorption of dietary copper.
- Ensure that all cows are fed dry cow minerals during the dry period, and supplemental trace minerals are fed during lactation, especially where pasture and other feeds used on the farm are marginal or deficient.

See nutrition chapter for further details on herd nutritional management.



Key Stages and Goals in a Successful Breeding Season

February



6 weeks before mating start date (MSD)
Approx. 9 March

4 weeks before MSD
Approx. 23 March

March



Mating start date key target

70% of herd cycling by MSD

$$\frac{\text{Number of cows with green paint}}{\text{Number of cows with green paint} + \text{Number of cows with red paint}} \times 100 = \%$$

Calculate the % of the herd that is cycling by dividing the number of cows with green paint (cows in heat) by the number of cows with green or red paint (cows available for breeding) and multiply by the figure 100.

April



Mating start date MSD
Approx. 20 April

Heat Detection

Heat Detection

Heat Detection

Period of Artificial Insemination Use

STEP 1

Bulls should be bought 2-3 months before you intend to use them (early June)

- Source from a clean herd
- Screen for infectious diseases
- Vaccinate with the same programme as the cows

STEP 2

One month before MSD Identify pool of cows you intend to breed from. This will include:

- Calved cows
- Heifers
- Cows yet to calve

On approx 23 March apply **red tail paint** to all milking cows. Body condition score all cows.

All cows



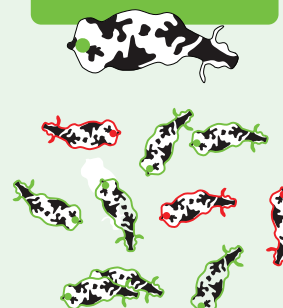
STEP 3

Examine tail paint twice weekly.

Record dates when tail paint was removed - this will help predict future heats.

Where red paint is disturbed by mounting apply **green tail paint**.

Cows observed in heat



STEP 4

At mating start date (MSD) calculate the percentage of cows cycling.



Mating start date

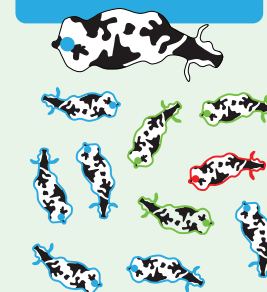
Carefully observe cows (at least 30 minutes, 3 times a day) to detect if they are in heat.

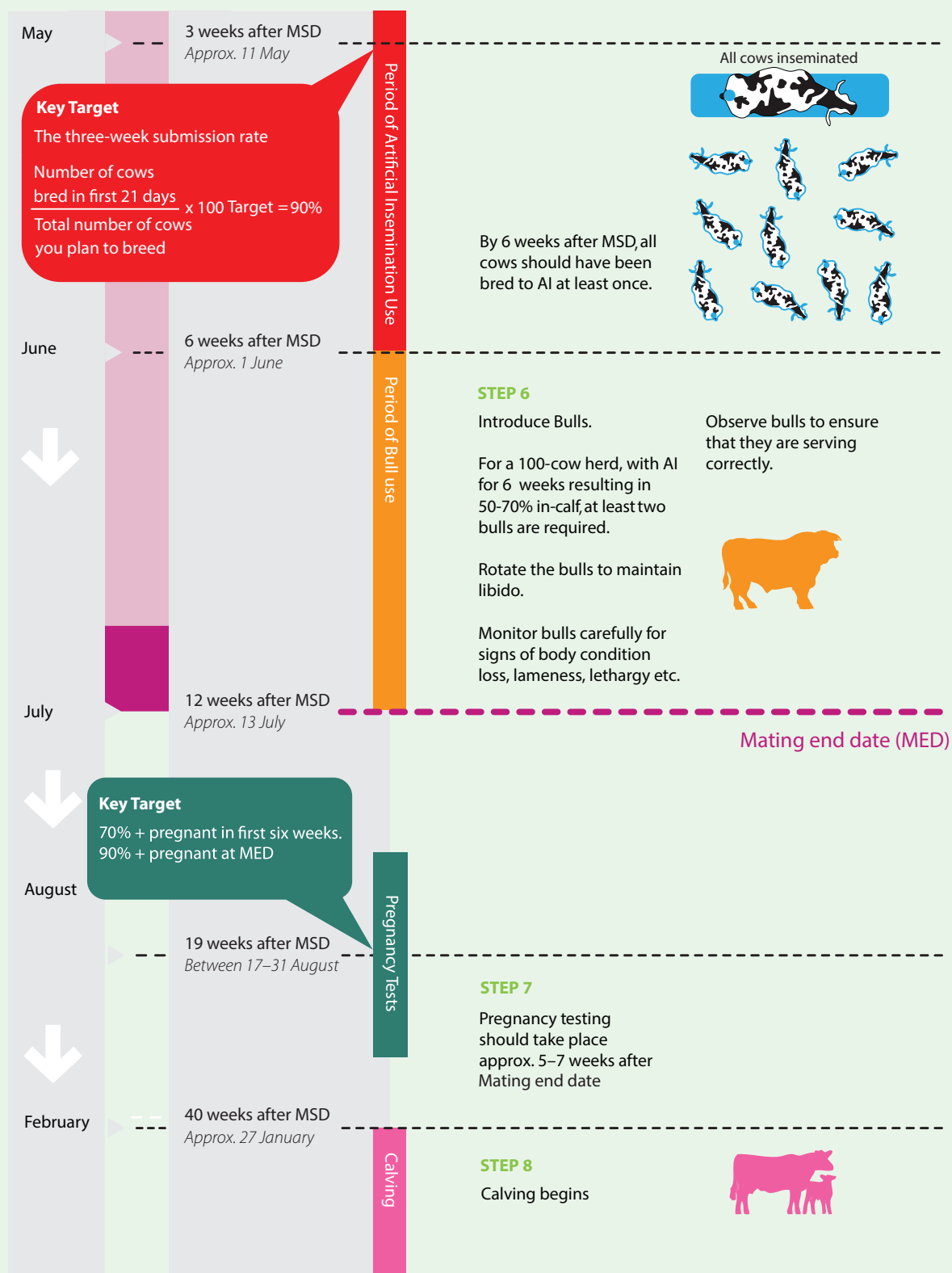
STEP 5

Identify cows in heat and use AI - paint inseminated animals with **blue tail paint**

If cows continue to show signs of heat, repeat artificial insemination

Inseminate cows (AI)

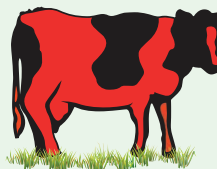




Dairy Cow Reproduction



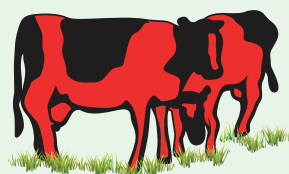
Sniffing of the vulva or
urine of other cows



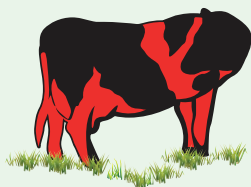
Scuffed tail head, dirty
flanks and sweating



Resting chin on another cow - both
cows may come on heat



Bunting - both cows
may come on heat



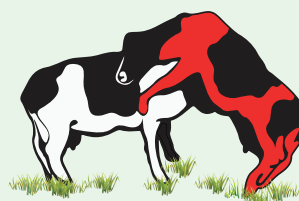
Soliciting



Bellowing and restless



Licking - both cows
may be in heat



Mounting head to head



Standing to be mounted

The positive sign of heat is standing
to be mounted.

The cow in heat (coloured red)
stands to be mounted and
does not move away

Figure 3. Signs of heat

Section 7

Purchasing Dairy Stock

by Emer Kennedy



Introduction

Individual circumstances will determine whether the strategy is to buy calves, weanlings, 12-month old heifers, 15-month old heifers, springers or milking cows. The whole enterprise could be threatened by buying low quality, diseased animals, so this is a relatively risky part of establishing the enterprise.

- ① What are the key factors to consider when buying stock?
- ② How should I go about acquiring stock?

Purchasing Dairy Stock

① What are the key factors to consider when buying stock?

- disease status
- cost of animals (staying within budget)
- genetic merit of the animals (EBI)
- calving date for acquired animals.



② How should I go about acquiring stock?

How to

Acquire the animals

- Bring an experienced person with you to identify good stock.
- Buy only from herds that meet your key targets.
- Only buy if the owner provides access to:
 - disease status information
 - details of the herd vaccination programme
 - details of SCC levels, ideally take your own milk samples
 - EBI report
 - fertility report
 - co-op performance report
- Negotiate price and method of payment.
- Buy from as few herds as possible, agree transport arrangements/delivery dates and quarantine animals on arrival.

How to

Decide which category of animal to buy:

	Pros	Cons	Recommendation
Calves	Relatively cheap High genetic merit Lower disease risk Better control of weight/body condition	Up to two years from production Higher potential losses Work involved in calf-rearing	Buy 20% more than numbers required to allow for losses
In-calf heifers	No SCC problems Heifers will last longer/lower cull rates Closer to production than calves	Lower initial yield than cows More expensive than calves Potentially more calving problems than cows Require a longer dry period after first lactation	Buy 5% more than numbers required to allow for losses
Cows	It may be possible to buy a full herd Animals producing immediately Detailed records on production and disease available	Higher cull rate than heifers Higher disease risk than heifers/calves Possibly higher cell count than for heifers It is more difficult for mature cows to settle into a herd Lameness is a risk	Buy from as few herds as possible

Section 7

Bull Selection Guidelines

by George Ramsbottom



Introduction

Breeding the type of dairy cows that suit your milk production system is an essential step in the development of your dairy enterprise. Teagasc advice is to use high Economic Breeding Index (EBI) AI bulls to achieve this. The EBI is a measure of the relative profitability of the progeny of a sire and it is expressed in euros. Higher EBI sires produce daughters that are more profitable than the daughters of low EBI sires. Milk production and fertility are the two most valuable traits in the index.

- ① How do I select appropriate AI sires?
- ② Why use AI rather than a stock bull?
- ③ How do I estimate the sub indexes for future calves?

Bull Selection Guidelines

Key target

To breed replacement heifers with the genetics to meet your breeding objectives.

① How do I select appropriate AI sires?

How to

Select appropriate AI sires for your herd

- Establish the genetic merit of your herd – this is available through participation in HerdPlus.
- Decide on your herd's priority breeding objective e.g. to breed a herd of highly fertile cows.
- Set genetic targets appropriate to your breeding objective e.g. to breed heifers with an average fertility index of €140.
- Select a team of bulls from the 'Active Bull List' that will deliver the heifers required.

② Why use AI rather than a stock bull?

Advantages of AI over a stock bull:

- There is a large genetic advantage
- more bulls to choose from
- greater range of traits available to choose from
- less physical danger handling/managing a bull
- reliability – a stock bull is circa 30% reliable – a team of four AI bulls will have a team reliability of more than 90%
- AI bulls will have come through a rigorous selection process, genomic selection and calving difficulty survey
- bulls are at risk of disease (e.g. BVD, IBR etc.) and physical injury (e.g. muscle strain etc.)
- a live bull may perform poorly due to insufficient libido etc.



③ How do I estimate the sub indexes for future calves?

How to

Estimate EBI and sub indexes of the next generation of calves

To do this you need to know the EBI and sub indexes of the sires and dams of the next generation of calves – add the values for each trait together and divide by two as outlined in the following table.

	Herd EBI (€)	Milk index (€)	Fertility index (€)	Predicted difference (P.D.) milk (kg)
Example herd	140	30	70	+ 50
Average of AI sires Used	350	120	190	+ 100
Estimate for calves born	245	75	130	+75



Key risks

In selecting bulls



Risks	How to mitigate the risk
Low EBI bulls are chosen	Select bulls from the latest version of the 'Active Bull List'
Low EBI reliability	Use five bulls in similar proportions to ensure the reliability of the bulls used
Inbreeding	Use the Sire Advice programme to match cows with unrelated AI sires

Key Performance Indicators

Key performance indicators in breeding and bull selection include:

- The average EBI of the AI sires used is >€350
- The average EBI of the heifers born is >€100 higher than the herd EBI



Section 7

Replacement Heifer Management

by Emer Kennedy



Introduction

When mated with high EBI sires, heifers bring new superior genetics into a herd. Heifers can help improve the herd calving pattern as their calving date is more easily managed than for mature cows. When calving early, heifers can produce very profitable milk from grass and achieve higher lifetime output than later calving animals.

- ① What are the key target weights for replacement heifers?
- ② How do you successfully rear calves from 0-3 months?
- ③ How do you manage replacement calves from weaning to housing?
- ④ How do you manage replacement heifers over the first winter?
- ⑤ How do you manage replacement heifers in their second season?

Replacement Heifer Management

① What are the key target weights for replacement heifers?

Key target

Table 1. Bodyweight (BW) targets for maiden heifers at breeding and for heifers pre-calving by breed/crossbreed.

	HF	NZ	HF*NZ	NR	HF*NR	J	HF*J
6-month heifer BW (kg)	175	160	175	160	175	125	145
Maiden heifer BW(kg) approx 13 months old	330	315	330	315	330	240	295
Pre-calving BW, (kg) approx 24 months old	550	525	550	525	550	405	490

HF = Holstein–Friesian, NZ = New Zealand, NR = Norwegian Red, J= Jersey

Key risks



Heifers don't achieve desired weights

Poor fertility in replacement heifers is often due to heifers being underweight at mating start date (MSD). This can be avoided if weight and weight gain of the heifers is regularly monitored. Heifers can be weighed individually on a weighing scales or a representative proportion of heifers brought to a weigh bridge to get an indication of their weight.

Once the mature weight of the herd is known, target weights can be calculated by using a proportion of mature bodyweight (BW) e.g. 30% mature BW at 6 months, 60% mature BW at 15 months or breeding and 90% mature BW at calving.

- A newborn calf has only limited immunity to disease. Colostrum contains antibodies from the mother which help protect the calf against disease while its own immune system 'gets going'.
- In general, older cows produce more, better quality, colostrum than heifers calving for the first time.
- The best source of colostrum is the calf's own dam for two main reasons i) biosecurity (concerns about the potential spread of Johne's disease) and ii) the calf will acquire immunity to fight diseases encountered on the home farm.

② How do you successfully rear calves from 0-3 months?

Key risks



Calves don't receive adequate colostrum, soon enough

Colostrum or 'biestings' is the rich milk cows produce after calving, which is present for up to six milkings and is the single most important factor in reducing calf deaths.

How to



Ensure calves get enough colostrum

- Absorption of the antibodies in colostrum is greatest in the first few hours of life and starts to decline after four to six hours, and ceases 24 hours after birth.
- Calves should receive either three litres of colostrum within two hours of birth by stomach tube or at least two litres within four hours or a total of four litres within 12 hours after birth by bottle feeding.
- The initial feed of colostrum should be from the first milking from the cow.
- Colostrum should be fed for another 2–3 days.

- Excess fresh colostrum should be frozen in 2-3l packs for easy use when required.
- Frozen colostrum should be let thaw naturally as heating (e.g. in the microwave) may reduce quality.
- Many calves suckle colostrum from their dam but there is no guarantee that they will achieve sufficient intake so always monitor the calf's progress.

How to

Rear calves from the colostrum feeding stage to weaning

- Feed whole milk or milk replacer to dairy calves at a rate of 4l/calf/day during the first week after birth.
- Increase milk feeding rate to 5-6 litre/calf/day thereafter.
- Young calves must eat solid feed to stimulate rumen development.
- Concentrate should be available to calves after a week or so, even though concentrate intake is negligible in the first three weeks of life.
- Calves have a high energy requirement and making concentrate available helps them to achieve greater dry matter intake than with diets based on roughage only.
- Fresh water should be available at all times.
- Once-a-day (OAD) milk feeding can be introduced from approximately three weeks of age, however calves should be introduced to concentrate and/or straw/hay before changing to OAD feeding.
- Calves are frequently individually penned for the first few days after birth in order to ensure that adequate colostrum is received. Check that they have learned to drink properly before they are group penned.

Key Risks



- Waste milk (i.e. milk unfit to go into the bulk tank) should not be fed to calves due to a risk of transmission of infectious pathogens. Also, never feed milk containing antibiotic residues (as it increases the risk of antibiotic resistance).
- High volumes of milk or milk replacer do not cause diarrhoea in young calves; nutritional diarrhoea is a consequence of either poor quality liquid feed or management failures such as feeding antibiotic milk, not feeding calves enough and/or poor hygiene.

How to

Manage once-a-day milk feeding

- The same volume of milk that was being fed twice a day can be offered in one single feed, at a time that best suits the calf feeder.
- Fresh water should be available at all times.
- Solid feed intake will increase when calves are fed milk OAD so ensure that there is a plentiful supply of solid feed available.

Key Facts



Legislation:

- By law, calves must be fed at least twice daily. As calves are totally dependent on liquid feed for at least the first three weeks of life OAD milk feeding should not commence before three weeks. When calves are being fed milk OAD they must be thoroughly checked on a second occasion during the day and offered concentrate (i.e. a second feed) at this time.

Replacement Heifer Management

Alternatives



Calf housing

- There are numerous ways in which calves can be housed – individually or grouped, indoors or outdoors. Regardless of housing system, good hygiene is essential. Disease will increase if bacteria are allowed to build up in the housing area, feeding equipment etc.
- Healthy calves are able to deal with sub-zero temperatures as long as they receive adequate amounts of energy and are provided with overhead shelter from wind and rain.
- Similar levels of weight gain can be achieved with indoor and outdoor systems of housing.
- Ideally all calves should be reared indoors for at least the first three weeks and be sure they are healthy and strong before turning them outdoors.
- A well sheltered paddock (e.g. surrounded by trees) should be used when rearing calves outdoors.
- Calves should be provided with overhead shelter (the picture below shows an example of a portable shelter which provides sufficient shelter).



- If possible calves should be offered fresh grass at regular intervals. This can be achieved by using a double strand of electric wire.
- If calves become ill or are showing signs of ill-thrift outdoors they should be brought back in and treated. They can return outdoors once they are well enough.

Indoor housing

Key risk

Poor ventilation

- Inadequate ventilation of calf houses allows levels of humidity, noxious gases, dust and bacteria to rise, increasing the risk of disease.



Guideline accommodation specifications for replacement heifer calves:

Ventilation	Specifications
Inlet (m ² /calf)	0.08 (0.05 on exposed sites)
Outlet (m ² /calf)	0.08 (0.05 on exposed sites)
Cubic air capacity (m ³ /calf)	6-8
Roof pitch	22°
Space boarding	20-25mm gap/50-200mm board (12 mm on exposed sites)
Maximum number	
Per pen	16
Sharing a common airspace	50
Canopy height above calf (m)	1.0-1.8
Maximum canopy extension (m)	(individual pens) 1.5 (group pens)
Floors	
Individual space (m ² /calf)	1.6
Group space (m ² /calf)	2.3
Minimum slope	1:20
Passageways	
Minimum width (m)	1.2

Key Risks

Cross contamination



- Frequently newborn calves are housed indoors in areas contaminated by other calves or older cattle. High mortality rates can result.
- Preferably cows and calves should not be housed under the same roof (i.e. sharing the same air space) even at calving time, due to the spread of pathogens.

Key Risks

Respiratory disease



- For indoor reared calves the quality of bedding material is crucial to minimising heat loss. Deep straw bedding is superior to other bedding material as an insulator; calves can nestle into it which can help prevent respiratory disease in naturally ventilated calf barns.
- Solid dividers between group pens will reduce the risk of respiratory disease.

Key Facts:



- European legislation prohibits solid walls in individual calf pens, it allows calves to be kept individually for the first eight weeks of life, but encourages group housing for animal welfare reasons.

Grouping of calves

- Individual housing of calves, either indoors or outdoors, is linked with improved calf health; however this can require a large investment in terms of finance and labour.
- If calving patterns are not compact, there is a temptation to mix younger calves with older animals for ease of management. However, older calves can be a source of respiratory infection for younger calves.
- Although not very common in dairy calf rearing systems 'all in-all out' systems can help prevent disease transmission from older animals, contribute to better hygiene due to total emptying of the pens, and allow more uniform feeding as groups consist of similar size animals.
- Calves in stable groups have higher daily live weight gain than calves in groups where new calves are continuously introduced to and brought out of the group. Diarrhoea and respiratory disease are also greater among calves in these 'dynamic' groups.
- Calves that are showing signs of ill-health should be removed from group pens immediately and treated so as to minimise the risk to other calves. Ideally these calves should not rejoin their cohorts.

How to



Manage weaning

- Calves can be weaned once they consistently consume 1kg of concentrates per day.
- To ensure constant growth rates, weaning should be gradual, with the volume of liquid feed declining gradually over a period of some days.
- Calves should be at least 80kg before weaning. By weaning on weight a more uniform group of calves is achieved.
- Later calves should be weaned at a heavier weight to maintain the uniformity of size of the main group of calves.

③ How do you manage replacement calves from weaning to housing?

How to



Manage post-weaning

- Rotational grazing in a leader/follower system is the preferred grazing option, with calves grazed ahead of yearlings.
- As calves are selective grazers, they should be offered fresh grass but should not be left in the same paddock for long periods of time.
- Calves should be rotated. A 'calf paddock' where calves remain for the summer is a bad idea.
- Ideal pre-grazing grass covers for calves are 1,000–1,400 kg DM/ha.
- Concentrate can be offered post weaning (1–2 kg/calf) but can be removed from the diet after 4–6 weeks and an all-grass diet offered.

Replacement Heifer Management

- Calves should be grouped on size, and if a calf is not keeping pace with the rest of the group it should be transferred to a more appropriate group.
- If calves are below-target weight, a good response to autumn supplementation can be achieved.
- A good worming programme should be followed during the summer months - consult your vet or Animal Health Ireland (AHI) publications.

④ How do you manage replacement heifers over the first winter?

How to

Ensure heifers reach development goals. First winter



- Prior to the first winter, heifers should be weighed (ideally in August) to ensure that they are on target to achieve the desired body weight at mating start date (MSD).
- If not at correct weight, supplementation should be provided as it will be too late to address this at breeding.
- Heifers should be turned out to pasture in early spring i.e. at least six-weeks before MSD.
- Generally higher weight gains are achieved from pasture than from winter diets (weight gains of more than 1kg/day are achievable in early spring at pasture).
- If replacement heifers are not a uniform group, the lighter animals should be prioritised and turned out to pasture earliest and offered concentrates if necessary.
- Consult vet or AHI publications about worming and housing.

Alternatives



There are a number of feeding options available for heifers during the first winter:

- If offering a silage-only diet, heifers should be ahead of their target weight, as a weight gain of only 0.3kg/day can be expected over the winter from a 70% DMD (dry matter digestibility) silage.
- Typically, silage and 1.5–2kg concentrate/day will result in a weight gain of almost 0.5 kg/day.

- Forage crops such as kale are also suitable for replacement heifers during their first winter – however these should only be used on drier soil types where there is limited chance of poaching damage.
- Forage crops are grazed *in situ* and are high in crude protein (~18% CP; see nutrition section) which will also help growth of the animal.
- Weight gains of over 0.5kg/day are achievable from these crops.
- Heifers grazing forage crops should be supplemented with a bolus to ensure sufficient intake of essential minerals.

Key Risks



- If grass growth is poor there will be insufficient grass to meet the feed demand of all heifers. In this situation the turn out date can be delayed but lighter heifers should be selected and turned out earlier than the main group.
- Work in Teagasc Moorepark has shown that although growth rates are lower when grass supply is limited, they still tend to be greater than those achieved on overwinter diets.
- Frosted kale should not be offered to heifers due to risks of bloat.
- In general, compensatory growth does not occur in heifers offered silage-only diets over the winter and should not be relied upon as a method to achieve target weight at MSD.

⑤ How do you manage replacement heifers in their second season?

How to

Manage grazing during year two



- Heifers should be offered an all-grass diet throughout their second grazing season and concentrates should only be fed to light heifers in early spring if required.
- Good quality silage is generally sufficient for in-calf heifers during the second winter provided that they are up to the target weight at housing. Spring born in-calf replacement heifers will eat 1.1t of 20% DM silage per month. Heifers that are below target liveweight may be fed up to 2.0kg of concentrates per head per day until 6-8 weeks pre-calving.

Please see appendix at end of manual on the 1,2 3, rule for colostrum management.





Section 7

Contract Rearing of Replacement Heifers

by George Ramsbottom, John Donworth



Introduction

Contract heifer rearing is worth considering where land or labour is limited, or where replacement heifers are failing to reach desired liveweight targets. It can also be helpful where cows must be separated from young female animals for disease control purposes (e.g. Johne's disease).

- ① What are the risks in off-farm heifer rearing?
- ② How important is body condition score?
- ③ What disease control issues must be considered?
- ④ What are the expected guideline costs?

Contract Rearing of Replacement Heifers

① What are the risks of off-farm heifer rearing?

- With animals on two farms, the risk of either group contracting diseases such as TB, leptospirosis etc. is doubled. If the rearer is simultaneously taking heifers from other owners or has another livestock enterprise, the risks may be further multiplied. Contingency plans must be put in place to ensure that an outbreak of disease does not prevent the smooth return of the heifers to the dairy farm at the end of the rearing period, or result in calving heifers 'stuck' with a rearer with no facilities to calve or milk such animals.
- Not all rearers will be suitably skilled to achieve the target weights set down for replacement heifers. It is vital that heifers are weighed at defined times throughout the rearing process (e.g. before 1st winter; pre-breeding and before 2nd winter) to ensure that targets are achieved.
- Risk of conflict between the owner and rearer. In all cases, clear targets must be agreed by both parties in advance of entering the contract arrangement. An independent party should be agreed in advance who will arbitrate in the event of a conflict.

Most risks can be minimised by preparing a written contract of agreement. If underweight heifers are returned to the farmer, who is at fault? The easy answer is the rearer, however, both parties may be at fault. The rearer failed to manage the heifers and the dairy farmer failed to manage the rearer. It is the dairy farmer's future that is affected in the long-term. Heifers that are underweight at calving will produce less milk during their lifetime.

② How important is Body Condition Score?

A study conducted by Teagasc Moorepark monitoring 1,400 heifers on more than 40 farms concluded:

- Bodyweight and body condition score (BCS) of maiden heifers at mating start date (MSD) is more critical than the age at which the heifers are mated.
- Heavier heifers at MSD produce significantly more milk in their first lactation.

- Heifers in low BCS at MSD (less than 3.0) calved later and produced significantly less milk during first lactation.
- Weight at first calving also significantly affects second lactation milk yield.
- Details of the target live weights are listed in the replacement heifer management chapter.

③ What disease control issues must be considered?

Diseases associated with replacement heifers fall into two categories – regulatory diseases (TB and brucellosis) and non-regulatory diseases which include the viral diseases, BVD and IBR, bacterial diseases, leptospirosis, Johne's, salmonellosis, mycoplasmosis and parasitic diseases such as neosporosis.

Off-farm heifer rearing makes closed herd farming unrealistic. However, a number of other biosecurity measures should be strictly implemented to reduce the disease risk.

Always:

- Establish the current disease status of the heifer's herd of origin. Such information is important in determining the likelihood of disease exposure before the heifers leave the farm, and is absolutely critical to the management of the heifer herd once they are reintroduced to the herd. They will need protection (e.g. management and vaccination strategies) against circulating diseases in the herd of origin before their reintroduction.
- Ideally engage in a contract with a single heifer rearer.
- If possible, view heifers previously reared on the rearer's farm.
- Implement a strategic vaccination protocol for heifers based on the disease status of the farm of origin. If required, BVD vaccination should be carried out at a specific time before breeding (specified by the vaccine manufacturer) and heifers should receive a primary course of two injections separated by the correct time interval. Incorrectly administered vaccines will not yield the desired level of disease protection.
- Implement a parasite control strategy to include roundworm, fluke and lungworm.

- Return in-calf heifers to the owner's farm six weeks before they calve down. This is to ensure that they are not being transported on the point-of-calving and are properly acclimatised to their environment so that they also have the required level of 'local' antibodies in their system before calving.
- The pre-movement test should be carried out when heifers are approximately 22 months of age. Its specific date should take into account the time-lag between the taking of tests and the results being returned to the farmer e.g. the TB and blood tests take three and at least five days, respectively before the results are returned to the farmer.

4 What are the expected guideline costs?

The guideline net cost of rearing a replacement is €1,553 per head. The figure includes a charge of €221 per head for the farmer's own labour over the full 24-month period. A land charge based on an opportunity cost of €350/ha is also included. An adjustment for the cost of empty replacement heifers is incorporated in the model. The rearer will incur both variable and fixed costs. Typically, calves will move to the rearer's farm on 1 May. They will return home in early December of the following year. The data in Table 1 indicates the guideline level of cost that may be incurred while on the rearer's farm. It excludes the costs incurred prior to the arrival on the rearer's farm (at 3 months of age) and those incurred after the heifers return home to the dairy farmer's own herd (at 22 months of age).

The costs of rearing replacements will vary considerably from farm to farm.

- Some rearers will feed more concentrates than the quantity assumed in Table 1.
- Additional silage may be required at the start of the second winter.
- Some farmers may feed kale during the first winter which would decrease costs.

Table 1. Estimate of variable and fixed costs incurred in rearing spring born replacement heifers from 1 May to 1 December of the following year.

No. days	1 May to 1 December 579
Breed of animal	Holstein Friesian
Concentrates	€48
Grass	€183
Silage	€99
Vet/AI	€70
Fixed costs	€104
Labour	€180
Total	€684
Cost/week	€8.27
Cost/day	€1.18
Average daily gain/replacement	0.83 kg

The labour charge assumed in Table 1 is €15 per hour and the time incurred is 12 hours per heifer for the 579 day period. This includes the cost of heat detection. The number of hours spent rearing the replacement heifers may be lower on beef farms where labour is more efficiently employed than average or where heifers are bred to a stock bull (so that labour intensive heat detection is not required).



Contract Rearing of Replacement Heifers

Issues to be considered in a rearing contract

Formal written contracts for rearing replacement heifers have been in place in New Zealand for over 20 years. Approximately 70% of heifers are grazed off-farm with a written contract in place. Farmer experience with replacement heifer contracts is that they are not fool-proof. When difficulties arise, the contracts will not legally protect the owner. However contracts do allow for some of the day to day issues that will arise during the off-farm period to be identified, discussed and agreed upon before the heifers arrive on the rearer's farm.

A number of questions need to be addressed.

- What are the dates of arrival/planned removal of animals to/from the rearer's farm?
- What are the agreed final and intermediate weights – will the heifers be weighed and if so, by whom and at what stage?
- Are there dosing and vaccination programmes – who pays/who administers?
- Is there a breeding programme – AI or stock bull sourcing/type, who does the heat detection?
- How will mortality be addressed?
 - Who covers the cost of disposal;
 - Is the rearer paid for rearing the heifer up until the date of death or will rearing costs be refunded?
- Who will pay for the transport of the heifers to and from the rearers farm?
- How often will the owner visit the rearer's farm to check the heifers?
- How will empty heifers be managed – will they be fattened on the rearers farm or returned?
- How will heifers be managed across the winter e.g. on ad-lib first cut grass silage with 2 kg/head meals fed to heifers below 200kg on 1 November?
- How will heifers be managed during the grazing season e.g. rotationally grazed in a paddock system from 1 March to 1 November?
- What is the timing and quantity of concentrate supplementation?

